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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/781,881 | 02/12/2001 | Daniel J.C. Herr | 5347-204 | 9632 |

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| EXAMINER |
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ANGEBRANNDT, MARTIN J

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| ART UNIT | PAPER NUMBER |
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1756

DATE MAILED: 02/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/781,881

Applicant(s)

HERR ET AL.

Examiner

Martin J Angebrannt

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 2/12/01, 6/8/01 & 2/15/02.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,4,5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-40 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the coherent source being placed to directly irradiate the substrate surface and reflect off the reflector surface and the substrate including a photosensitive layer coated thereon to interfere with the coherent radiation coming directly from the source to record an interferometric holographic image in the photosensitive layer, does not reasonably provide enablement for the reflected light alone forming the interferometric image (a reference beam is needed see Joy et al. "Advanced SEM Imaging" page 659) or the use of a hologram (or interferometric article) as the reflected image. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims.

The applicant is using the forward scatter holographic technique in the manner described by Joy et al. "Advanced SEM Imaging" page 659. The difference seems to be the desire to record the image on a resist or a silicon oxide layer, rather than an electronic image detector. Please pay particular attention to figure 8 of Joy et al. "Advanced SEM Imaging" page 659 and figure 1 of the instant specification.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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4. Claims 1-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims should indicate clearly that the interferometric image is at the image place (photosensitive layer) and that the reflective surface is not holographic.

It should be made clear if the process embraces mere interferometrically measurement/testing of the surface or requires prior knowledge/design of the interference pattern projected (ie a particular design is desired)

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1,2,8-10,12,15,21,23,25,28 and 34-36 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Howells et al. '850.

Howells et al. '850 teaches the use of a reflective holographic image as the image and the grazing reflection off this holographic image onto an X-ray resist. (8/45-10/9 and figure 11).

Addressing issue 4, above would obviate this reflection as the reflective layer is holographic.

8. Claims 1,2,8,9,10,14,15,21,22,27,28, 34 and 40 rejected under 35 U.S.C. 102(b) as being fully anticipated by Atkinson et al. GB 2221353.

See the recording of the hologram and the replay of the hologram onto the resist coated surface with respect to figures 1 and 2.

It is not clear if the applicant from the claims if the applicant is recording an interference pattern or replaying it, therefore both processes are cited.

9. Claims 1,2,8,9,10,14,15,21,22,27,28, 34 and 40 rejected under 35 U.S.C. 102(b) as being fully anticipated by Mathisen '176.

See the recording of the hologram with respect to figure 4.

It is not clear if the applicant from the claims if the applicant is recording an interference pattern.

10. Claims 1,5-7,9,10,15,18-20,23,28,31-33 and 35-36 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Spence et al., "Low

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Energy Point Reflection Electron Microscopy", Surface Review and Letters, Vol. 4(3), pp. 577-587 (1997).

Spence et al., "Low Energy Point Reflection Electron Microscopy", Surface Review and Letters, Vol. 4(3), pp. 577-587 (1997) describes the use of a field emitter tip placed adjacent to a stepped surface with respect to figure 7 and describes the resulting Fresnel diffraction image emerging from this. The measurements are done using microchannel plates (MCP) as shown in figures 1 and 3.

It is not clear, that the measurement of the step shown in figure 7 was made using the microchannel plate detector. If it was, then the claims rejected under this heading are anticipated or alternatively, given the suggestion to do so in figure 7, it would have been obvious to use the experimental set-up shown in figure 3 to make the measurement using the microchannel plate detector.

11. Claims 1,5-7,9,10,14,15,18-20,22,23,27,28,31-33,35-36 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joy et al., "Advanced SEM Imaging", in Characterization and Metrology for ULSI Technology", 1998 international Conference, (03/1998), AIP conference proceedings 449, pages 653-666, in view of Spence et al., "Low Energy Point Reflection Electron Microscopy", Surface Review and Letters, Vol. 4(3), pp. 577-587 (1997).

Joy et al., "Advanced SEM Imaging", in Characterization and Metrology for ULSI Technology", 1998 international Conference, (03/1998), AIP conference proceedings 449, pages 653-666 teaches forward scattering holography with respect to figure 8 and the text on page 659. The particular detectors used are not disclosed.

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It would have been obvious to one skilled in the art to modify the process of Joy et al., "Advanced SEM Imaging", in Characterization and Metrology for ULSI Technology", 1998 international Conference, (03/1998), AIP conference proceedings 449, pages 653-666 by using a microchannel plate detection means such as that taught by Spence et al., "Low Energy Point Reflection Electron Microscopy", Surface Review and Letters, Vol. 4(3), pp. 577-587 (1997) with a reasonable expectation of capturing/resolving the desired diffraction image based upon the similarity of layout for the electron emitter tip and the scattering/reflection surface and the disclosure of measuring diffraction patterns in Spence et al., "Low Energy Point Reflection Electron Microscopy", Surface Review and Letters, Vol. 4(3), pp. 577-587 (1997).

12. Claims 1-7,9,10,14-20,22,23,27-33,35-36 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joy et al., "Advanced SEM Imaging", in Characterization and Metrology for ULSI Technology", 1998 international Conference, (03/1998), AIP conference proceedings 449, pages 653-666, in view of Elliott, "Integrated Circuit Manufacturing Technology", pp. 76-81 (1982) or Tetsuo et al., JP 11-329944.

Elliott, "Integrated Circuit Manufacturing Technology", pp. 76-81 (1982) establishes that electron beams resists are old and well known in the art.

Tetsuo et al., JP 11-329944 teaches the use of silicon layers which are able to be selectively oxidized as image detectors for electron beams.

It would have been obvious to one skilled in the art to modify the process of Joy et al., "Advanced SEM Imaging", in Characterization and Metrology for ULSI Technology", 1998 international Conference, (03/1998), AIP conference proceedings 449, pages 653-666 by using photoresists or oxidizable silicon layers as detection means as taught by Elliott, "Integrated

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Circuit Manufacturing Technology", pp. 76-81 (1982) or Tetsuo et al., JP 11-329944 with a reasonable expectation of capturing/resolving the desired diffraction image based upon the disclosure of the use of these means in the art for detection of electrons.

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

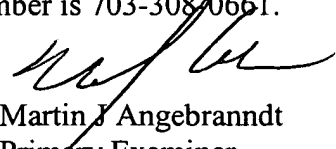
Koizumi et al. '427, Sawatari et al. '423, Makosch et al. '771 and JP 06-283585 teach surface measurement of contaminants using grazing angles.

JP 03-295408, Koerner et al. '256 and Moore '637 teaches measurement of surface topography using grazing angles.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebrannndt whose telephone number is 703-308-4397. The examiner can normally be reached on Available Mondays-Thursday and alternative Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



Martin J Angebrannndt
Primary Examiner
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January 27, 2003